



### REMARKS

Claims 1-3, 10-13 and 20-26 stand rejected under 35 USC 103(a) on Fukunaga (EP 0 920 096) in view of Yoshida (U.S. Patent Publication No. 2002/0041613). Applicants respectfully traverse this rejection.

Claim 1 recites, "a quantum well active layer deposited directly on the first conductivity-type lower clad layer; and a second conductivity-type upper clad layer deposited directly on the quantum well active layer." Neither Fukunaga nor Yoshida, alone or in combination, discloses or suggests such features.

Fukunaga (Fig. 1, paragraph [0017]) discloses a semiconductor device in which an optical waveguide layer 3 is deposited on a lower clad layer 2 and a quantum well active layer 4, 5, 6 (including barrier layers and a well layer) is deposited on the optical waveguide layer 3. Similarly, Fukunaga discloses that an upper optical waveguide layer 7 is deposited on the quantum well active layer 4, 5, 6 and an upper clad layer 8. Similarly, Yoshida (Fig. 1a, paragraph [0029]) discloses "sandwiching" a quantum well active layer 4 between optical confinement layers 3a and 3b. Accordingly, neither Fukunaga nor Yoshida discloses depositing a quantum well active layer directly on a clad layer or depositing a clad layer directly on a quantum well active layer as recited in claim 1. Claim 1 is therefore allowable.

Claims 2, 11, 12, 21, 22, 24 and 25 recite features substantially similar to those quoted above, and are therefore also allowable for at least the above reasons. Claims 10, 13, 20 and 26 depend from allowable claims and are allowable due at least to their respective dependencies.

Claim 3 recites that "a concentration of Zn doped in a quantum well active layer is  $2 \times 10^{17} \text{cm}^{-3}$  or less," as disclosed at least in paragraph [0016] of applicants' specification; neither Fukunaga nor Yoshida, alone or in combination, discloses or suggests such a feature. The Examiner concedes that Fukunaga does not disclose doping of a quantum well active layer, and instead asserts that paragraphs [0034] and [0035] of Yoshida disclose the feature. Applicants respectfully disagree.

While paragraph [0035] of Yoshida may disclose doping a quantum well active layer with Zn, it does not disclose or suggest a concentration of Zn for the doping. Paragraph [0034] does not disclose a doping concentration of Zn either, it merely discloses a doping concentration of S, Se ( $1 \times 10^{17} \text{cm}^{-3}$  to  $3 \times 10^{18} \text{cm}^{-3}$ ) and Si in a quantum well active layer. Yoshida's disclosure of a wide range of doping concentrations for S, Se and Si does not disclose or suggest a range of doping concentrations for Zn. Accordingly, claim 3 is allowable.

Claim 23 recites features substantially similar to those of claim 3 quoted above. Consequently, claim 23 is allowable for at least the same reasons as claim 3.

Claims 2, 4, 5, 12, 14 and 14 stand rejected under 35 USC 103(a) on Fukunaga (U.S. Patent Publication No. 2002/0044584; hereinafter, "Fukunaga-2") in view of Yoshida. Applicants respectfully traverse this rejection.

Claim 2 recites, "a quantum well active layer deposited directly on the first conductivity-type GaAs substrate; [and] a second conductivity-type upper clad layer deposited directly on the quantum well active layer." As with Fukunaga, Fukunaga-2 does not disclose or suggest such a feature, but instead discloses in Fig. 1 a semiconductor device wherein a first waveguide 3 is deposited on a first clad layer 2, a multilayer quantum well active layer 4, 5, 6 is deposited on the first waveguide 3, a second waveguide 7 is deposited on the quantum well active layer 4, 5, 6, and a second clad layer 8 is deposited on the second waveguide 7. As discussed above, this structure does not disclose or suggest the above quoted features of claim 2, which is therefore allowable. Claim 12 recites features substantially similar to those of claim 2 discussed above, and is allowable for at least the same reasons.

Claim 4 recites, "a quantum well active layer deposited directly on the first guide layer; [and] a second guide layer made of an AlGaAs-based material deposited directly on the quantum well active layer." Neither Fukunaga-2 nor Yoshida discloses or suggests such features. Similar to Fukunaga, Fukunaga-2 discloses (Fig. 3, paragraphs [0055]-[0058]) a semiconductor device

wherein an InGaAsP waveguide 57 is deposited directly on a quantum well active layer 54, 55, 56, an InGaAs etch stop layer 58 is directly deposited on the waveguide 57, and an AlGaAs waveguide 63 is deposited directly on the etch stop layer 58. The foregoing structure does not disclose or suggest the quoted features of claim 4, which is therefore allowable. Claim 14 recites features substantially similar to those of claim 4, and is allowable for at least the same reasons.

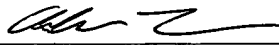
Claims 5 and 15 depend from allowable claims and are allowable due at least to their respective dependencies.

Claims 6-9 and 16-19 stand rejected under 35 USC 103(a) on Fukunaga and Yoshida in view of Fukunaga-2. Claims 6-9 and 16-19 depend from claims which are allowable according to the above Remarks, and are allowable due at least to their respective dependencies.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief, including extensions of time, and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing Docket No. **204552030500**.

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